

# MODIANO, JOSIF, PISANTY & STAUB

EUROPEAN PATENT ATTORNEYS\*\* U.S. PATENT AGENTS\*

Via Meravigli, 16 - I-20123 MILANO - ITALY

Phone IT+02+869 2442

Fax IT+02+863860

1-800 U.S.

11/13/00

DR. ING. G. MODIANO\* \*\* (Reg. No. 19,928)

DR. ING. A. JOSIF\* \*\* (Reg. No. 22,917)

DR. ING. M. PISANTY\*

DR. ING. G. STAUB\*

Daniel J. O'BYRNE\*\* (Reg. No. 36,625)

DR. ING. N. ZANOTTI\*

DIPL. ING. C. S. RENIERO\*

S. L. A. MODIANO\*

Milano, November 8, 2000

New US Application in the name of

Ernesto MARELLI

Agent's Docket: 33885/GM/1p

Hon.

COMMISSIONER OF PATENTS AND TRADEMARKS

WASHINGTON D.C. 20231

U. S. A.

Transmitted herewith are the following papers for filing a new Application:

1. Specification and claims; Declaration/Power of Attorney duly signed **November 6, 2000** and attached thereto;
- ~~2. Drawings on strong paper accompanying the specification (M.P.E.P. 608.02 rev. 81);~~
3. Deposit Account order for Filing Fee : \$ 355.= dated **November 8, 2000** (duplicate);
- ~~4. Deposit Account order for Assignment fee : \$ 40 dated~~
- ~~5. Assignment of the Invention to~~
6. Small Entity verified Statement.

The priority of the here-under listed Application(s) is respectfully claimed:

- Italian Application No. **MI99A002393** filed **November 16, 1999**

~~Italian Application No. filed~~

A Certified Copy of the priority Application(s) ~~will be sent in due course~~ is attached.

Please place of record in the file the enclosed papers and kindly acknowledge receipt thereof; please readily collect the credit specified in the Deposit Account order, so as to allow the Application to receive the earliest possible filing date, within:

NOVEMBER 16, 2000

Respectfully submitted



Guido MODIANO  
(Reg. No. 19,928)

Encls.:

-Spec./claims + Declaration/Power

~~Formal drawings~~

-Filing Fee Dep. Acc. order (duplicate)

~~Assignment + Fee dep. Acc. order~~

-Certified Copy

-Small Entity verified Statement

00/00/11  
195607/60  
JOSIF S. N. MODIANO

00/00/11  
195607/60  
JOSIF S. N. MODIANO

*duplicate*

Case Docket No. 33885/GM/cb

THE COMMISSIONER OF PATENTS  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the Patent Application of:

SMALL ENTITY

Inventor(s): **Ernesto MARELLI**

For: "DIESEL ENGINE FUEL IN MICROEMULSION FORM AND METHOD FOR PREPARING IT"

Enclosed are:

☒ Small Entity verified Statement.

☐ \_\_\_\_\_ sheets of drawing on strong paper (M.P.E.P. 608.02 – rev. 81)

☐ An Assignment of the Invention to \_\_\_\_\_

☒ A Certified Copy of a<sup>n</sup> Italian Patent Application

☐ Associate Power of Attorney


CLAIMS AS FILED				
(1) for	(2) number filed	(3) number extra	(4) rate	(5) basic fee \$ 355.=
Total claims	13 - 20 =		x \$ 9.=	
Independent claims	2 - 3 =		x \$ 40.=	
			Total filing fee	\$ 355.=

☒ Please charge my Deposit Account No. 13-3860 in the amount of \$ 355.=.  
A duplicate copy of this sheet is enclosed

☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Account No. 13-3860.  
A duplicate of this sheet is enclosed.

☐ A check in the amount of \_\_\_\_\_ to cover the filing fee is enclosed.

Milan, Italy  
November 8, 2000

  
\_\_\_\_\_  
Guido MODIANO  
(Reg. No. 19,928)

**VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS**  
**(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN**

Docket Number (Optional):  
**33885/GM/1p**

Applicant or Patentee: **Ernesto MARELLI**

Application or Patent No.:

Filing Date or Issue Date:

Title: **"DIESEL ENGINE FUEL IN MICROEMULSION FORM AND METHOD FOR PREPARING IT"**

I hereby declare that I am

☐ the owner of the small business concern identified below:

☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN **MEC SYSTEM S.r.l.**

ADDRESS OF SMALL BUSINESS CONCERN **Via Postale Vecchia, 1**  
**23881 AIRUNO - ITALY**

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

☒ the specification filed herewith with title as listed above.

☐ the application identified above.

☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

☒ No such person, concern, or organization exists.

☐ Each such person, concern or organization is listed below:

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING **Ernesto MARELLI**

TITLE OF PERSON IF OTHER THAN OWNER **Sole Administrator**

ADDRESS OF PERSONS SIGNING **Via Buttero, 20 - 23857 OLGiate MOLGORA - ITALY**

SIGNATURE

*Ernesto Marelli*

DATE

**November 6, 2000**

APPLICATION  
FOR  
UNITED STATES OF AMERICA

\*\*\*\*\*

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

Be it known that I,

Ernesto MARELLI  
Italian citizen  
of OLGiate MOLGORA  
ITALY

have invented certain improvements in

“DIESEL ENGINE FUEL IN MICROEMULSION FORM AND  
METHOD FOR PREPARING IT”

of which the following description is a specification.

## BACKGROUND OF THE INVENTION

The present invention relates to a fuel in microemulsion form, particularly for supplying Diesel engines, and to a method for preparing it.

5      Emulsions or microemulsions of petroleum products and water in which particular surfactants or mixtures of surfactants are used are known in the art.

For example, US-3,876,391 discloses microemulsions of hydrocarbon products with water in which a mixture of surfactants is used which is  
10    constituted by a first surfactant which is soluble in the oil phase and a second surfactant which is soluble in the aqueous phase, to which a further water-soluble additive, for example an amide, an alkanolamine, a polyamine or an aldehyde, is added.

US-4,465,494 discloses microemulsions of liquid fuels and water which  
15    contain an alcohol or an amine and, as surfactant, a salt of an alkylphenoxypolycarboxylic acid.

A fuel emulsified with water is disclosed in EP-630,398 and is obtained by mixing the compounds in a static mixer in particular pressure and temperature conditions in the presence of a mixture of surfactants  
20    constituted by sorbitan oleate, a polyalkylene glycol and an alkylphenol ethoxylate.

In general, the use of surfactants or other additives such as the ones mentioned above can entail problems both because they can be inherently corrosive with respect to the devices with which they come into contact and  
25    because toxic by-products can form during combustion.

Moreover, on the basis of the experience of the Applicant, emulsions of liquid fuels and water prepared according to conventional methods by adding appropriate surfactants generally entail stability problems even in optimum storage conditions, so that after a certain time an at least partial  
30    separation of the phases is observed which entails many drawbacks during

the combustion process owing to the non-uniformity of the supplied fuel.

EP-372,353 by the same Applicant discloses a stabilized emulsion of a fuel, particularly a fuel for Diesel engines, and water, with the addition of a product which acts as a lubricant and antifreeze, for example sorbitol  
5 monoleate. The stabilized emulsions of fuel are prepared by using a turbine-effect emulsifier such as the one disclosed in EP-124,061 in the name of this same Applicant.

Applicant has noted that in some cases, particularly in case of use of low-density fuels, the preparation of the fuels as disclosed in EP-124,061 and  
10 EP-372,353 entails a relatively high energy expenditure and a reduction in the productivity of the system, if one seeks high productivity and stability.

A method with improved efficiency for forming the emulsion of a fuel is disclosed in co-pending EPA No. 00121331.3 and corresponding co-  
15 pending US Application by the same Applicant, included herein by reference. This method requires the use of an apparatus having a particular geometry.

The above applications disclose an apparatus and a method for forming stabilized atomized microemulsions from different liquids which are normally immiscible; the apparatus comprises a primary chamber and a  
20 sequence of at least two cavitation chambers arranged in succession, means for feeding primary and secondary fluids into the primary chamber, and means for the exit of the formed microemulsion from the last cavitation chamber, the primary chamber and the cavitation chambers being fluid-connected to each other by way of fluid passage means which are adapted to  
25 produce a velocity of the fluids, during passage through the passage means, which gradually increases from the primary chamber toward the last cavitation chamber. The method according to the above applications comprises the stage of premixing the primary fluid with the secondary fluid, followed by the passage of the premix of fluids through a succession of  
30 steps of flow at a higher velocity alternated with steps of flow at a lower

velocity, the higher flow velocities gradually increasing from the first higher-velocity step to the last higher-velocity step.

### SUMMARY OF THE INVENTION

The aim of the present invention is to provide a fuel, particularly for Diesel engines, in microemulsion form which produces, in exhaust gases, a 97% reduction in the grade of smoke, a reduction of the carbon oxide content of more than 50%, a reduction of more than 1% in carbon dioxide, and a reduction in nitrogen oxides of more than 35-40% with respect to the conventional base fuel.

An object of the present invention is to provide a fuel in microemulsion form which is simple to prepare, for example by mixing the components with minimal agitation, without any need to follow a preferential order in adding the components.

Another object of the present invention is to provide a fuel in microemulsion form which poses no engine operation problems and can be stored in storage tanks in the same conditions as Diesel fuel.

Another object of the present invention is to provide a fuel for use in feeding Diesel engines, such as engines for medium-heavy transport, engines for heavy transport, marine engines, electric power generators and turbines and can also be used in civil heating applied to gas oil burners.

### DETAILED DESCRIPTION OF THE INVENTION

This aim and these objects and other aims and objects which will become better apparent hereinafter from the following description are achieved by a fuel, particularly for Diesel engines, in microemulsion form, which comprises a liquid fuel, an emulsifier or primary activating agent, an emulsive agent or secondary activating agent and water, said emulsive agent having a suitable HLB (Hydrophilic-Lipophilic Balance) value which is preferably higher than 9.

Preferably, the liquid fuel is a liquid fuel for Diesel engines, particularly Diesel fuel.

The Diesel fuel used to obtain the fuel according to the present invention can be Diesel fuel for automotive applications but also a Diesel fuel for different uses, including arctic Diesel fuel and winter Diesel fuel.

The emulsifier used to form the fuel according to the present invention  
 5 can be a sorbitan monoleate and is preferably a sorbitan monoleate having the characteristics given in Table 1.

Table 1: Sorbitan monoleate characteristics

Appearance at 20°C	Oily
Saponification number (mg KOH/g)	145-165
Color	light amber (Gardner 10 max)
Acidity index	7 max
Odor	sweet, fatty
Hydroxyl index (mg KOH/g)	190-215
Evolution temperature/range	Decomposes
Melting point	-13°C pouring temperature
Flammability point	> 200°C Pensky Martens method, closed cup
Self-ignition temperature	> 200°C
Non-explosive	
Density	1.010-1.040 g/cm <sup>3</sup> at 25°C
Can be dispersed in water, non-soluble	
pH 1% in water	neutral (approximately 7)
Viscosity	970-1080 mPa.s at 25°C
Acute toxicity	> 5000 mg/kg (rat)

10 As an alternative, in order to obtain the fuel according to the present invention it is possible to use other emulsifiers which are in any case still definable as sorbitan monoleate also of the hydroxystearate type, even with



a saponification number and a hydroxyl number which are lower than the ones indicated in Table 1 and an acidity number which is higher than the one indicated in Table 1.

The inventor of the present invention has found that the presence of the emulsive agent is fundamental both when the preferred emulsifier as indicated in Table 1 is used and when another alternative emulsifier is used.

Preferably, the emulsive agent is constituted by nonylphenol ethoxylate, which can also be defined as polyethylene glycol isononyl phenyl ether or as isononyl phenol ethoxylate, nonylphenol polyglycol ether, alkylphenol polyglycol ether, even more preferably with the characteristics stated in Table 2.

Table 2: characteristics of emulsive agent

No. of moles of ethylene oxide	6
Physical appearance at 25°C	clear colorless liquid
State transition	< approximately -10°C - MPL 1001,1
Turbidity point (10% in BDG at 25%)	68 to 69°C MPL 2001,0
Hydroxyl index	115 to 121 mg/KOH/g - MPL 1010,0
Average relative molecular mass	464 to 487 - calculated value
Free polyethylene glycols	>= approximately 3% by weight - MPL 2002,0
pH (5%)	5 to 7 - MPL 1007,0
Water (Karl-Fisher)	> = approximately 0.5% by weight, calculated
Ash	> = approximately 0.2% by weight, calculated
HLB	10.7, calculated

The inventor of the present invention has found that a fundamental characteristic of the emulsive agent comprised in the fuel according to the present invention is the emulsive capacity in order to allow the integration of water at a high level.

- 5     The emulsive capacity required for the purposes of the present invention is achieved by emulsive agents with a calculated HLB higher than 9, preferably higher than 10,7 for better hydrophilic properties. HLB (hydrophilic-lipophilic balance) reflects the balance of the hydrophilic-lipophilic properties of the emulsive agent and is determined with  
10   conventional methods which are typical in the chemical production field.

- The inventor of the present invention has found that such an HLB value is reached by a nonylphenol ethoxylate having the properties indicated in Table 2, and in particular with a number of ethylene oxide moles of no less than 6 (number of moles, i.e., amount of ethylene oxide material introduced  
15   in the manufacturing process).

      The nonylphenol ethoxylate used to obtain the fuel according to the present invention preferably has the chemical formula  $R-C_6H_4-(O-CH_2-CH_2)_nOH$  -->, where  $R = C_9H_{19}$  and n is approximately 6.

- Even more preferred emulsive agents, also with reference to possible  
20   future statutory aspects, are non-ionic surfactants such as for example  $C_{12}$   $C_{13}$  alcohol ethoxylate with an average of 8 moles of ethylene oxide, in particular having the following characteristics:

Physical appearance at 25°C	almost colorless turbid liquid
State transition at °C	15-20
Turbidity point °C	57-59
Number of hydroxyls mg KOH/gr	99-107
Average relative molecular mass	524-567
Free polyethylene glycols (% by weight)	≤ 3
pH (5%)	5-7

Water (Karl Fisher method) %	≤ 0.5
Ash % by weight	≤ 0.2
HLB	12.8

Moreover, a preferable emulsive agent is a C<sub>16</sub> C<sub>18</sub> cetyl stearyl alcohol ethoxylate with 11 moles of ethylene oxide of the non-ionic type, which can be combined with anionic and cationic surfactants, for example having the following characteristics:

Cetyl stearyl alcohol (fatty alcohol)	C <sub>16</sub> C <sub>18</sub> -11 moles of ethylene oxide
pH sol. 3%	5-7
NaCl 10% turbidity point	58-62°C
Hydroxyl number	69-75 mg KOH/g
Water content	≤ 1%
Melting point	37.5-39.5°C
Acidity number	≤ 1
Relative density at 70°C	0.962-0.965 g/cm <sup>3</sup>
Solidification point	≤ 35°C
Flash point	≤ 250°C
Solubility	clear solution in water at 40°C partial solution in water at 20°C
Appearance	solid
Color	whitish
Odor	almost non-existent (odorless)

Also these “emulsive agents” can be introduced in the same ratios as those provided for nonylphenol ethoxylate, i.e., from 5 to 20 parts in 1000 parts of intact Diesel fuel.

The presence of the emulsive agent C<sub>16</sub>C<sub>18</sub>-11 moles of ethylene oxide, when the microemulsion is processed in particular through the EMDT5 system provided with multiple reverse-flow coaxial turbines according to EPA No. 00121331.3 and to the corresponding co-pending US Application

by the same Applicant, allows to form stable microemulsions, such as environment-friendly fuels for Diesel engines, even with demineralized water up to 15% by weight of bio-vegetable fluids, such as for example biodiesel or methyl esters composed of rapeseed and sunflower oil which  
5 are commercially available and cannot be used in their natural state as fuels for Diesel engines since they cause seizure and produce bad odors.

The presence of emulsive agents such as  $C_{12}C_{13}$  and  $C_{16}C_{18}$  alcohols with 8 and 11 moles of ethylene oxide is therefore a significant help also in significantly reducing the "French-fries" odor that is typical of the  
10 combustion of a methyl ester in its natural state, in addition to more easily assisting the presence of an antifreeze such as monoethylene glycol, even at 3 to 6% with respect to the percentage of water; the presence of a biocide for "antibacterial protection" in order to provide "resistance to bacterial and fungal attack" is also helpful.

Preferably, the fuel in microemulsion form according to the present invention comprises, in parts per volume, for 1000 parts of conventional Diesel fuel, 13 to 17 parts of emulsifier, 5 to 20 parts of emulsive agent, and  
15 100 to 145 parts of water.

The water used is preferably demineralized water, but it is also possible  
20 to use water from the water mains, preferably filtered and at a maximum temperature of 40-45°C.

The fuel according to the present invention can contain, preferably in an amount between 400 and 800 ppm, products based on polyisobutylene succinic anhydride and also specific biocide products.

The addition of products based on polyisobutylene succinic anhydride meets a possible requirement of improving the cetane number (owing to the presence of water) and also of giving better characteristics toward low temperatures. The biocides meet the optional need to avoid the formation of bacterial colonies due to the presence of the sorbitan monooleate and due to  
25 the natural bacterial presence in Diesel fuel containment tanks, which grows  
30

especially in hot climates ( $>27^{\circ}\text{C}$ ).

The fuel according to the present invention can be obtained by mixing the components, i.e., conventional base fuel, preferably Diesel fuel, emulsifier, emulsive agent and water, with minimal agitation. The formation  
5 of the microemulsion is practically instantaneous and is revealed by an instantaneous change of color of the mixture of components, which becomes white. The instantaneous behavior is also an essential visual parameter for determining the result.

The microemulsion is formed even as easily as by placing the  
10 components in a container, even a bucket, and by performing minimal agitation. The microemulsion is characterized by microcells having dimensions substantially smaller than  $0.15\text{ }\mu\text{m}$ .

The resulting microemulsion is stable even after centrifugation at over  $35,000\text{ m/s}^2$ .

The preparation of the fuel according to the invention, which is termed  
15 GECAME-2, occurs substantially spontaneously or in any case with minimal agitation of the components, without the need for devices such as the turbine-effect emulsifier. However, for the sake of high productivity in a particular short time, the fuel according to the invention can be formed by  
20 using an apparatus such as the one disclosed in co-pending EPA No. 00121331.3 and corresponding co-pending US Application by the same Applicant. The use of such a device is suggested merely owing to the fact that this system allow homogenization of large volumes substantially instantaneously with very low industrial costs.

25 The disclosures in Italian Patent Application No. MI99A002393 from which this application claims priority are incorporated herein by reference.

WHAT IS CLAIMED IS:

1. A fuel, particularly for Diesel engines, in microemulsion form, comprising a liquid fuel, an emulsifier and an emulsive agent, said emulsive agent having an HLB value higher than 9.

5 2. The fuel according to claim 1, wherein the liquid fuel is a Diesel fuel.

3. The fuel according to claim 1, wherein said emulsifier is sorbitan monoleate.

4. The fuel according to claim 1, wherein said emulsive agent is chosen from the group constituted by nonylphenol ethoxylate, C<sub>12</sub>-C<sub>13</sub> alcohol ethoxylate, and C<sub>16</sub>-C<sub>18</sub> cetyl stearyl alcohol.

5. The fuel according to claim 4, wherein said nonylphenol ethoxylate has a number of ethylene oxide moles at least equal to 6.

6. The fuel according to claim 4, wherein said C<sub>12</sub>-C<sub>13</sub> alcohol is ethoxylated on the average with 8 moles of ethylene oxide.

15 7. The fuel according to claim 4, wherein said C<sub>16</sub>-C<sub>18</sub> cetyl stearyl alcohol is ethoxylated on the average with 11 moles of ethylene oxide.

8. The fuel according to claim 1, further comprising products based on polyisobutenyl succinic anhydride.

9. The fuel according to claim 1, further comprising biocide products.

20 10. The fuel according to claim 1, comprising in parts per volume, for 1000 parts of liquid fuel, 13 to 17 parts of emulsifier, 5 to 20 parts of emulsive agent, and 100 to 145 parts of water.

11. A method for preparing a fuel, particularly for Diesel engines, in microemulsion form, comprising the mixing of a liquid fuel, particularly a  
25 liquid fuel for Diesel engines, an emulsifier and an emulsive agent, said emulsive agent having an HLB value of more than 9.

12. A fuel, particularly for Diesel engines, in microemulsion form, obtainable with the method according to claim 9.

30 13. The fuel according to claim 1, capable of not dissociating its components even when subjected to centrifugation up to values of more

than  $35,000 \text{ m/s}^2$ .

ABSTRACT OF THE DISCLOSURE

A fuel, particularly for Diesel engines, in microemulsion form, comprising a liquid fuel, an emulsifier and an emulsive agent, the emulsive agent having an HLB value higher than 9. The invention also relates to a  
5 method for preparing a fuel, particularly for Diesel engines, in microemulsion form, which comprises the mixing of a liquid fuel, particularly a liquid fuel for Diesel engines, an emulsifier and an emulsive agent, the emulsive agent having an HLB value of more than 9, and to a fuel which can be obtained by means of the method.



## Declaration and Power of Attorney for patent Application

### Dichiarazione e procura ai fini della domanda di brevetto

Italian Language Declaration Docket No. 33885/GM/1p

Il sottoscritto inventore dichiara che:

La propria residenza, recapito postale e cittadinanza corrispondono a quanto indicato in calce, sotto la propria firma.

Ritiene di essere il primo ed unico inventore originale (se viene elencato in calce a solo nominativo) o il coinventore primo ed originale (se è elencato più di un nominativo) del oggetto rivendicato e per il quale il sottoscritto presenta domanda di brevetto. La invenzione in questione è chiamata

#### CARBURANTE PER MOTORI DIESEL IN FORMA

#### DI MICROEMULSIONE E PROCEDIMENTO PER

#### PREPARARE LO STESSO

e la sua descrizione è allegata alla presente Dichiarazione a meno che non sia spuntata la seguente casella:

- ☐ Il \_\_\_\_\_  
è stata depositata una domanda di brevetto  
statunitense numero o una domanda di brevetto  
internazionale PCT numero \_\_\_\_\_  
che è stata modificata il  
\_\_\_\_\_ (se applicabile).

Il sottoscritto dichiara in oltre di aver letto e compreso il contenuto della descrizione identificata in precedenza, rivendicazioni comprese, come modificati dall'eventuale modifica summenzionata.

Il sottoscritto riconosce l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codice dei Regolamenti Federali, §1.56.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

#### DIESEL ENGINE FUEL IN MICROEMULSION

#### FORM AND METHOD FOR PREPARING IT

the specification of which is attached hereto unless the following box is checked:

- ☐ was filed on \_\_\_\_\_  
as United States Application Number or PCT  
International Application Number \_\_\_\_\_  
\_\_\_\_\_ and was amended on  
\_\_\_\_\_ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

## Italian Language Declaration

Il sottoscritto rivendico con la presente la priorità prevista dal Titolo 35, Codice degli Stati Uniti, § 119(e)-(d) o § 365(a) in relazione a qualsiasi domanda o domande estere di brevetto o certificato di inventore, o dal Titolo 35, § 365(a) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale è designato almeno un paese diverso dagli Stati Uniti, I suddetti domande e certificati essendo elencati sotto, e, spuntando le seguenti caselle, ha anche identificato sotto qualsiasi domanda estera di brevetto o certificato di inventore, o domanda internazionale PCT, la cui data di deposito preceda quella della domanda per la quale è rivendicata la proprietà.

Prior foreign application(s)

Domande Estere Anteriori

**MI99A002393**

(Number)  
(Numero)

**ITALY (ITALIA)**

(Country)  
(Nazione)

(Number)  
(Numero)

(Country)  
(Nazione)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codici degli Stati Uniti, § 119(e), in relazione a qualsiasi domanda o domande provvisorie degli Stati Uniti elencate sotto.

(Application No.)  
(N° della domanda)

(Filing Date)  
(Data di deposito)

(Application No.)  
(N° della domanda)

(Filing Date)  
(Data di deposito)

Il sottoscritto rivendica con la presente i benefici previsti dal Titolo 35, Codice degli Stati Uniti, § 120, in relazione a qualsiasi domanda o domande statunitensi, o dal Titolo 35, § 365(c) degli stessi Codice in relazione a qualsiasi domanda internazionale PCT nella quale sono designati gli Stati Uniti, I suddette domande essendo elencate sotto e, nella misura in cui l'oggetto di ciascuna rivendicazione di questa domanda non sia stato esposto nella domanda statunitense o internazionale PCT anteriore nel modo previsto dal primo paragrafo del Titolo 35, Codice degli Stati Uniti, § 112, riconosco l'obbligo di rivelare informazioni essenziali ai fini della determinazione della brevettabilità ai sensi del Titolo 37, Codici dei Regolamenti Federali, §156, le quali diventino disponibili durante il periodo compreso tra la data di deposito della domanda anteriore e la data di deposito nazionale o internazionale PCT della presente domanda.

(Application No.)  
(N° della domanda)

(Filing Date)  
(Data di deposito)

(Application No.)  
(N° della domanda)

(Filing Date)  
(Data di deposito)

Con la presente, il sottoscritto dichiara veritiere tutte le affermazioni contenute in questa domanda in relazione alle proprie conoscenze e di ritenere vere tutte le affermazioni o informazioni presentate. Dichiara inoltre che tali asserzioni sono state espresse nella piena consapevolezza che le dichiarazioni intenzionalmente false sono punibili con una multa, l'incarcerazione o entrambe, ai sensi della Sezione 1001 del Titolo 18 del Codice degli Stati Uniti e che tali dichiarazioni intenzionalmente false possono mettere a repentaglio la validità della domanda o di qualsiasi brevetto rilasciato in merito.

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventors certificate or PCT International application having a filing date before that of the application on which priority is claimed:

Priority not claimed

Diritto di priorità non rivendicato

**16 NOVEMBER 1999 (16.11.1999)** ☐

(Day/Month/Year Filed)  
(Giorno, Mese/Anno di deposito)

☐

(Day/Month/Year Filed)  
(Giorno, Mese/Anno di deposito)

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Status) (patented, pending, abandoned)  
(Stato) (concessione di brevetto, in corso di esame, abbandono)

(Status) (patented, pending, abandoned)  
(Stato) (concessione di brevetto, in corso di esame, abbandono)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## Italian Language Declaration

PROCURA: Io, sottoscritto inventore, nomino con la presente il seguente avvocato o avvocati e/o agente o agenti al fine di intrinseca questa pratica e di condurre tutte le operazioni ad essa pertinenti presso l'Ufficio dei Brevetti e Marchi di Fabbrica: (Elenzare il nome ed il numero di matricola)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (List name and registration number)

Guido MODIANO (Reg. No. 19,928)

Albert JOSIF (Reg. No. 22,917)

Daniel J. O'BYRNE (Reg. No. 36,625)

Inviare le corrispondenza a:

MODIANO & ASSOCIATI

Via Meravigli, 16

20123 MILANO - ITALY - EUROPE

Telefonare a:

(02) 86.92.442

Nome e cognome dell'unico o del primo inventore <b>Ernesto MARELLI</b>		Full name of sole or first inventor <b>Ernesto MARELLI</b>	
Firma dell'inventore <i>Ernesto Marelli</i>	Data <b>06.11.2000</b>	Inventor's signature <i>Ernesto Marelli</i>	Date <b>Nov. 6, 2000</b>
Residenza <b>23857 OLGiate MOLGORA - ITALIA</b>		Residence <b>23857 OLGiate MOLGORA - ITALY</b>	
<b>Via Buttero, 20</b>		<b>Via Buttero, 20</b>	
Cittadinanza <b>Italiana</b>		Citizenship <b>Italian</b>	
Recapito o Casella Postale <b>come Residenza</b>		Post Office Address <b>same as Residence</b>	
Nome e completo dell'eventuale secondo coinventore		Full name of second or joint inventor	
Firma del secondo inventore	Data	Inventor's signature	Date
Residenza		Residence	
Cittadinanza		Citizenship	
Recapito o Casella Postale <b>come Residenza</b>		Post Office Address <b>same as Residence</b>	

(Fornire le stesse informazioni e le firme del terzo e degli ulteriori coinventori.)

(Supply similar information and signature for third and sub-sequent joint inventors.)